

REMARKS

Rejections Under 35 USC §103

Claims 79-82, 87, 88, 90-93 and 96 have been rejected under 35 USC 103(a) as being unpatentable over Malhi et al (US Patent No. 5,088,190) or Elder et al (US Patent No. 5,123,850) in a first set, in view of Nakano (JP Hei 3-69131) in a second set, and Blonder et al. (US Patent No. 4,937,653) or Bindra et al (US Patent No. 5,137,461) in a third set.

Claims 78-82, 87, 88, 90-93 and 96 have been rejected under 35 USC 103(a) as being unpatentable over Nakano in a first set, in view of Blonder et al. or Bindra et al. in a second set.

The 35 USC §103 rejections are respectfully traversed for the reasons to follow.

Argument

MPEP 2142, 2143 set forth the three basic criteria for establishing a prima facie case of obviousness under 35 USC §103(a). First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success in obtaining the claimed invention based upon the references relied upon by the Examiner. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Malhi et al. '190 and Elder et al. '850 were cited as disclosing test apparatuses similar to the present test apparatus. Nakano was cited as teaching a penetration limiting contact. Blonder et al. and Bindra et al. were cited as teaching plural raised portions on a contact structure.

Applicants would firstly argue that the references do not teach or suggest all of the present claim limitations such that the third criteria of the above cited MPEP rule is

not met. Specifically the references do not teach the limitation of relating the biasing force produced by a clamping mechanism to the structure of a contact to achieve penetration limitation. In this regard the Office Action states:

"The force ranges claimed are considered obvious to one skilled in the art and would be scaled appropriately for that being tested. Applicants' arguments that Nakano has no clamping mechanism are contested by the Examiner. No drawing exists in Nakano showing a clamping mechanism, but Nakano indicated that the probe of Figure 2a "butts up against pad 25" and "deep scoring of pad 25 by probe contact 22 is prevented". (See page 5, lines 17 plus of Nakano et al.) Something has to force the probe against that being tested. It might be a weight, a press or a clamp. All would seem equivalent and obvious to one skilled in the art. Note that the first set uses clamps. Both Blonder et al. and Bindra et al. must use something akin to a clamp to hold the parts together."

In response, Applicant submits that Nakano is a probe card, such that biasing force is not produced by "a clamping mechanism attached to the plate". In Figure 1b of Nakano something biases the silicon chip 10 against the integrated circuit chip 24, but it is not a clamping mechanism attached to the plate which supports the integrated circuit chip 24 as presently claimed. With a conventional wafer prober the wafer is supported on a first movable plate, and the probe card is supported on a second movable plate. One or both of the plates are then moved together, and a biasing force is applied through the plates, rather than through a clamping mechanism attached to one of the plates as presently claimed. With a probe card this biasing force can be externally controlled because the plates are movable.

This is not the case with the present test apparatus which is assembled and then used without external controls. Admittedly clamping mechanisms as exemplified by Malhi et al. '190 or Elder et al. '850 are known in the art. However, at the time of the present invention these clamping mechanism were oversized to exert large biasing forces to insure

electrical contact with the device being tested. The large biasing forces also produced damage to the device. The Examiner contends that the biasing forces were inherently selected to prevent damage, but this was not the case. Accordingly, bondpads damaged during testing were a major concern at the time of the present invention (see page 8, lines 1-7 of the present specification).

With respect to Blonder et al. and Bindra, these references teach bonded connections, such that damage to the contacts is not as big an issue as with the test apparatus presently claimed. The Examiner states that these references "must use something akin to a clamp to hold the parts together". However, there is no suggestion of a clamp in either reference. Further, there is no suggestion of relating the structure of the contacts to the biasing force. Still further, as pointed out by the Examiner a weight or a press might be used, but these elements are not the same as the presently claimed clamping mechanism.

Applicants would secondly argue that neither the references nor the prior art in general provide the motivation for combining the references in the manner of the Office Action. With respect to the proposed combination the Office Action states:

"It would have been obvious to one of ordinary skill in the art at the time of the invention was made to have adapted the contact structure of the second set modified to have plural raised portions in accord with the third set to the apparatus of the first set because one of ordinary skill in the art would realize that so doing would result in better contact being made."

The proposed motivation for combining the references is thus "better contact being made". Admittedly, better contact is an issue for test applications, but it is unlikely that one skilled in the art would combine the cited references based solely on this issue. Rather, it appears that the

Examiner has used the teachings of the present application as a road map for combining the references.

In view of the amendments and arguments, it is submitted that amended claims 78-82, 87, 88, 90-93 and 96 and added claims 97-98 are now in a condition for allowance. Also being submitted with this CPA is an Information Disclosure Statement and a Petition For Extension of Time (30 day). Should any issues remain, the Examiner is asked to contact the undersigned by telephone.

DATED this 7th day of December, 2000.

Respectfully submitted:



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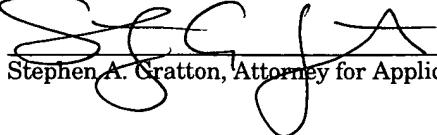
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Stephen A. Gratton, Attorney for Applicants

MARKED VERSION TO SHOW CHANGES MADE TO AMENDED CLAIMS

78. (six times amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate;

a substrate on the plate comprising a plurality of contacts configured to electrically contact the pads;

a clamping mechanism attached to the plate configured to bias the contacts and the pads together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and the substrate with the contacts in electrical contact with the pads; and

each contact comprising a bump and a plurality of spaced raised portions projecting from the bump with a height, the raised portions dimensioned to penetrate into a pad at the force to a penetration depth equal to [a] the height [of the raised portions] but less than a thickness of the pad, the bump dimensioned to limit further penetration of the raised portions into the pad at the force.

87. (five times amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate comprising a plurality of external leads;

a substrate on the plate comprising a plurality of contacts configured to electrically contact the pads;

a clamping mechanism attached to the plate configured to bias the contacts and the pads together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between

the mechanism and the substrate with the contacts in electrical contact with the pads;

each contact comprising a bump and a plurality of spaced raised portions projecting from the bump with a height, the raised portions configured to penetrate into a pad with a penetration depth equal to the height but less than a thickness of the pad while the bump limits further penetration, the force selected to be greater than a first force at which the raised portions penetrate the pad but less than a second force at which the bump penetrates the pad, the second force being from two to ten times the first force.

[; and]

[a plurality of conductive traces on the substrate in electrical communication with the contacts and with the external leads.]